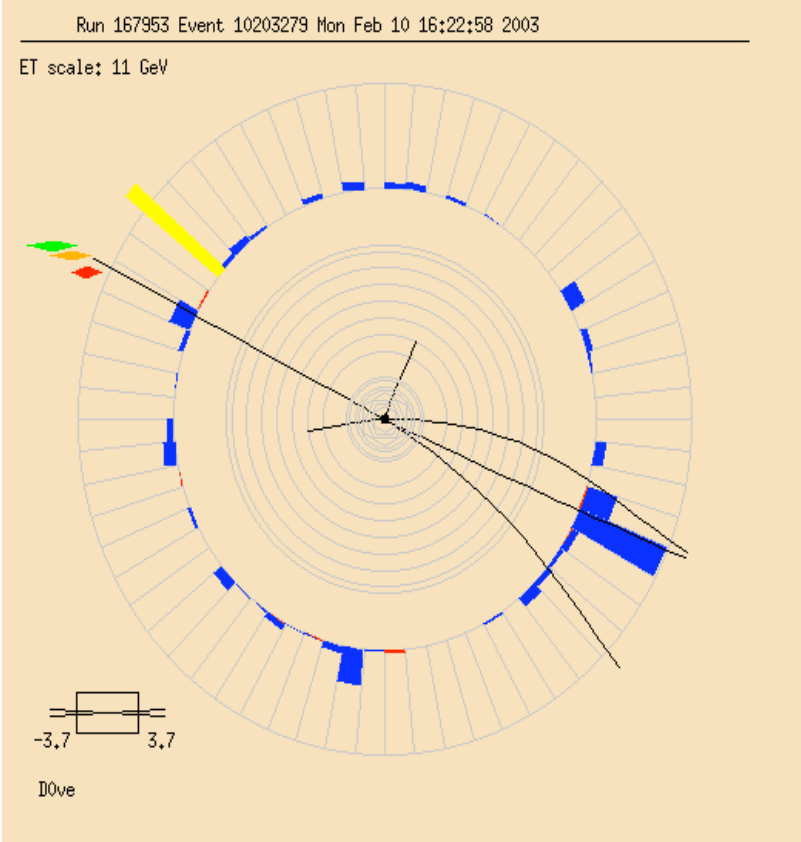
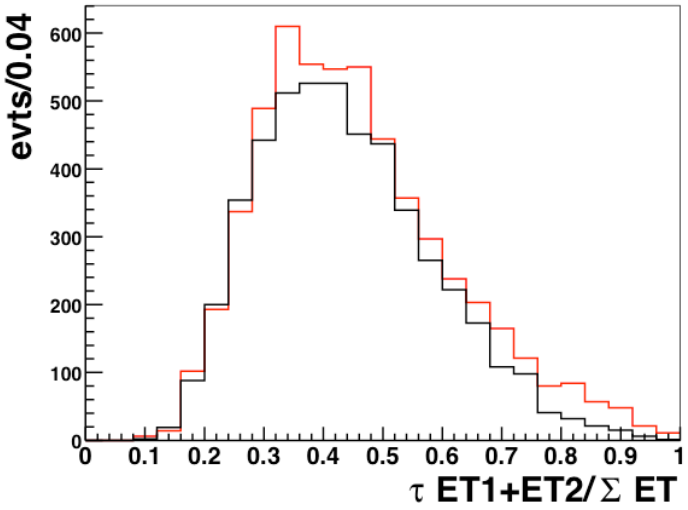
Z □> □□□> □ had



- Preselection
- Efficiencies (muon)
- Backgrounds + Cuts
- Trigger
- Back to the Tau
- ..and what remains to be done

Preselection

- The Muon:
  - medium
  - track match (Saclay, not axial)
  - use central track momentum
  - pT > 15 GeV (at first)
  - for signal: muon isolation
- The Tau
  - Tau object with >=1 track
  - not the same object as muon



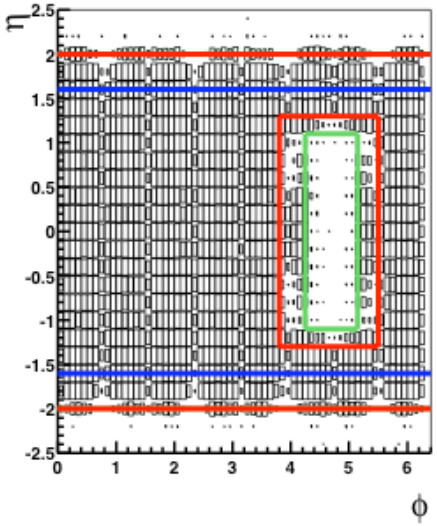
Muon efficiencies

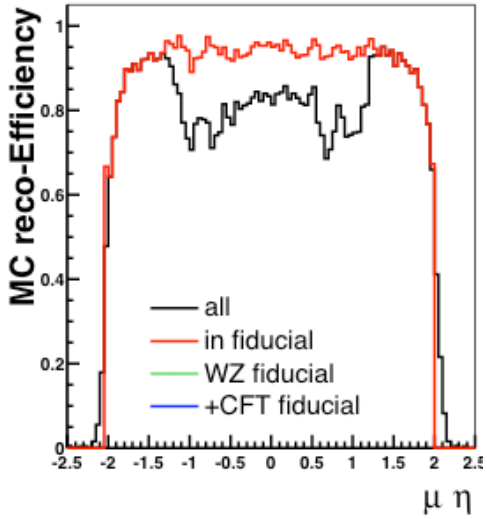
- acceptance*pT
- reconstruction
- track match
- trigger
  - L1
  - L2
- timing

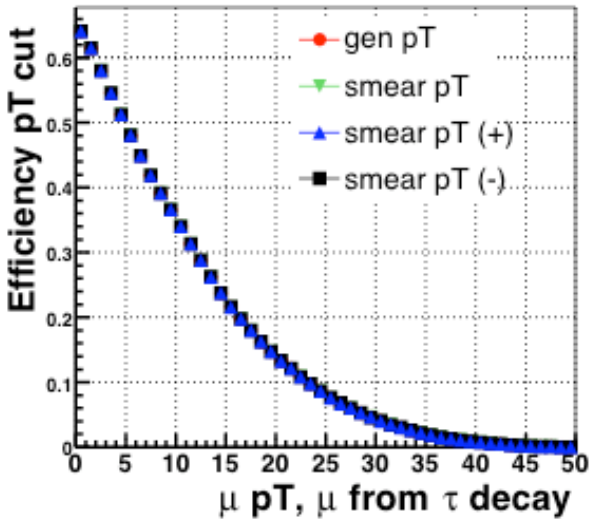
Requirement	Efficiency
within fiducial region	0.690 ± 0.005
pT above 6 GeV	0.449 ± 0.027
pT above 15 GeV	0.216 ± 0.027
L1 trigger	0.955 ± 0.013
L2 trigger	0.916 ± 0.007
reconstruction	0.85±
track match	0.9 ±
timing	0.989 ± 0.0024

Muon acceptance*pT

- use Z □□ MC
- use MC reco-eff to define region “where detector is”
- use generator level MC to determine acceptance*pT cut
- smear Gen-level pT to reproduce Z-width (W □□ measurement)

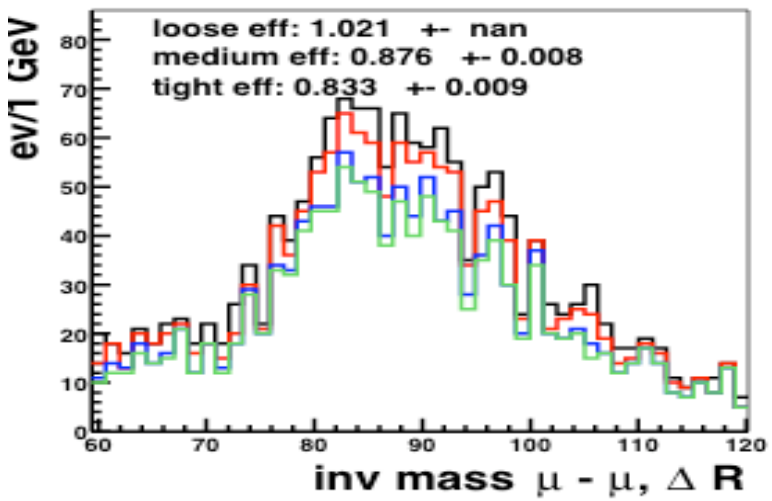


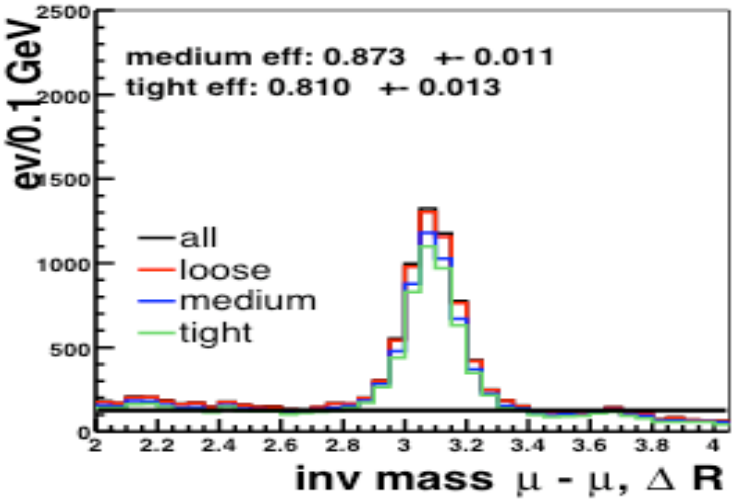




Muon Reco-Efficiency

- Use di-□ events in mutrk-skim
- Require events to have Trigger w. 1 L2 □
- Tagging □ of medium quality w. track, matched to L2 □ -> 2nd □ unbiased
- Second □ track (+cal), invariant mass of dimu: Z or J/psi



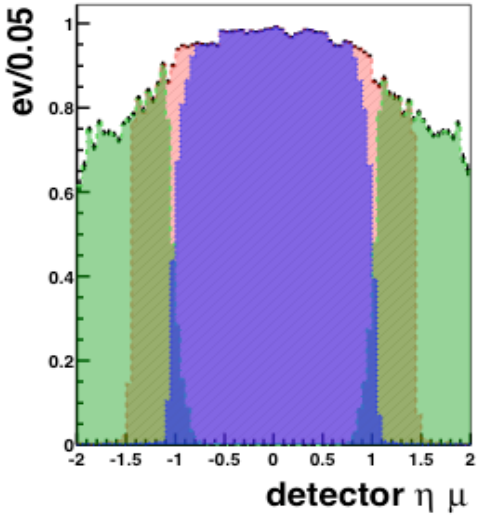


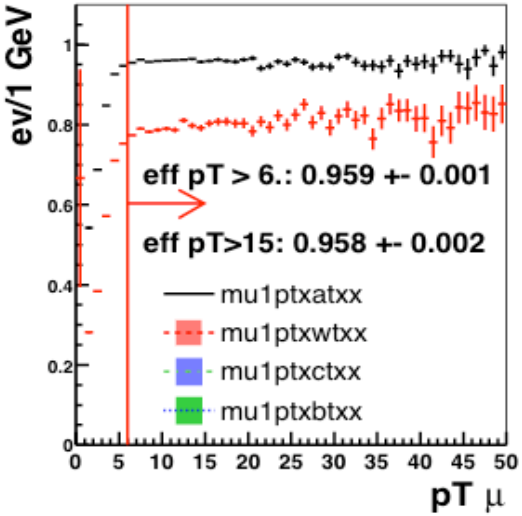
Muon Track*Match Efficiency

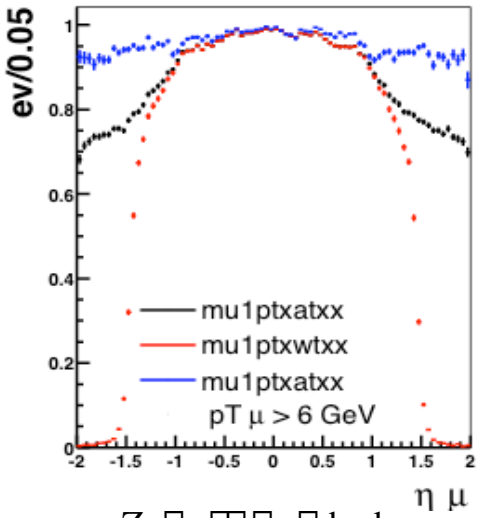
- Use two methods:
  test+tag + count #evts.
  with 0,1 or 2 matches
- Use J/psi + Z peak
- Start from di-mu
  stream, require two
  medium muons

Muon Trigger Efficiency - L1

- Use top muTrig skim
- Check L1 AO terms



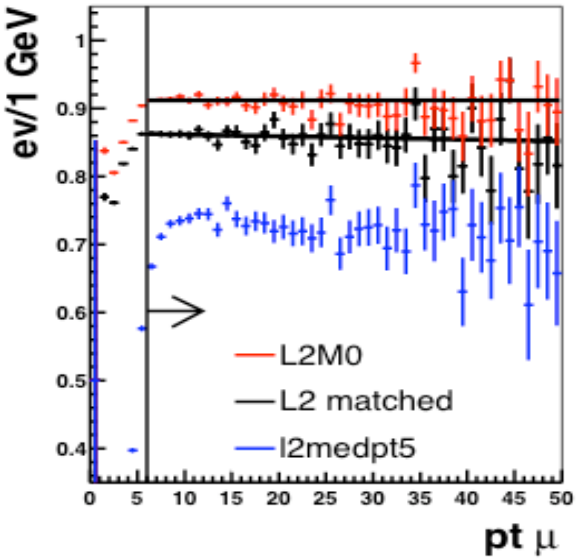


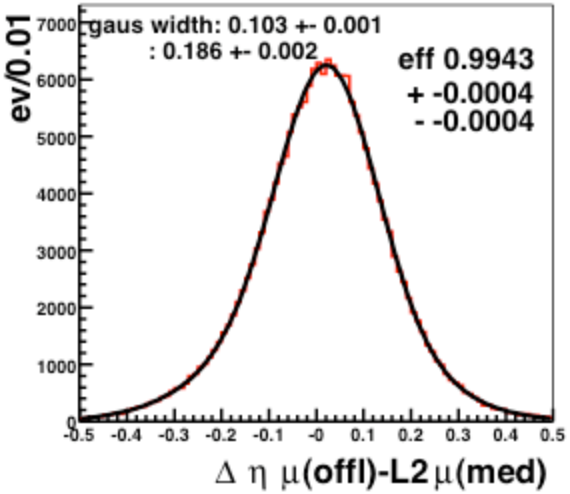


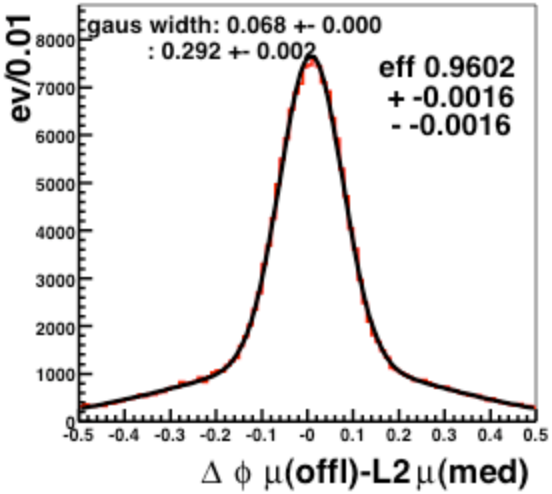
Z □ □□ □ had

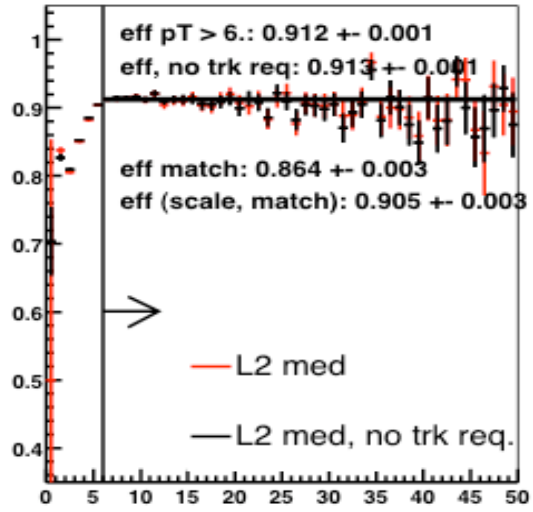
Muon Trigger Efficiency- L2

- Require L1 all
- For L2: look at global □, match to offline □, compare L2M0 req.



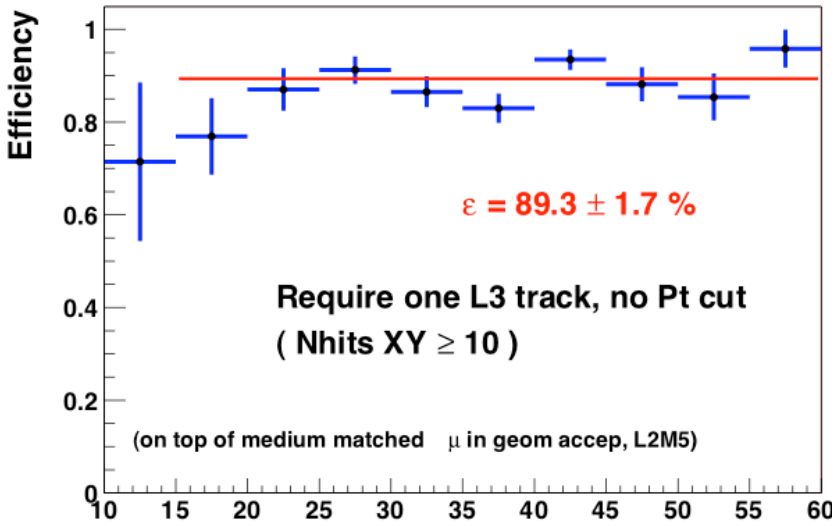


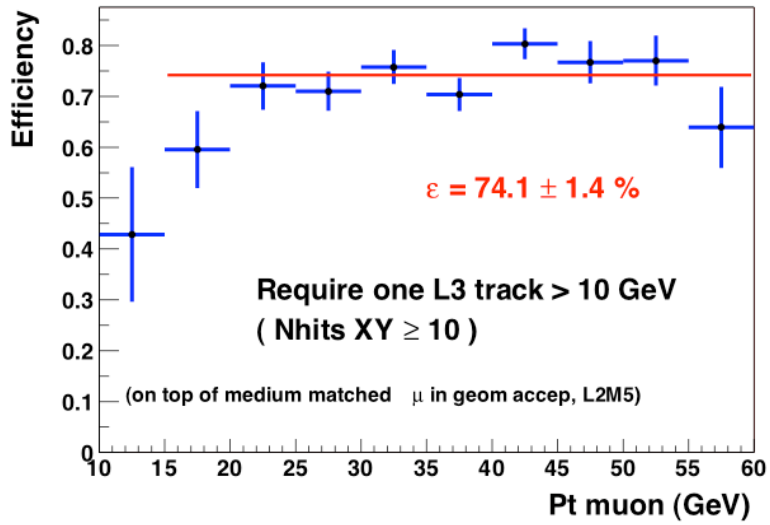




Muon Trigger Efficiency- L3

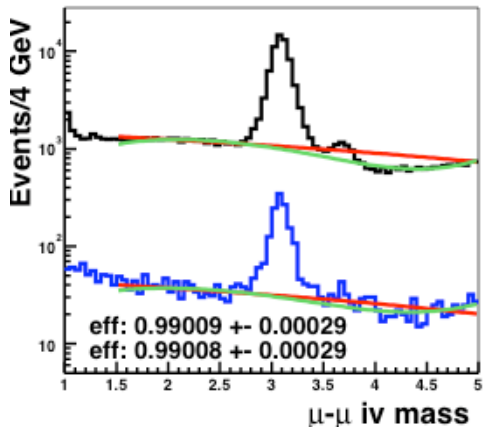
- Copy WZ-results:
  - Req. L2M5
  - Use Z events, treat each as seed for W event
  - Trig-sim event+ check L3 track

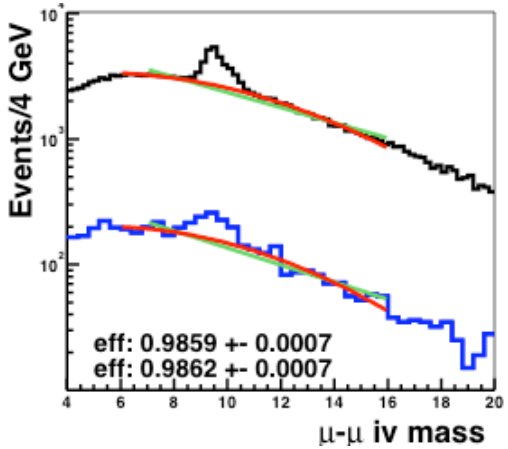


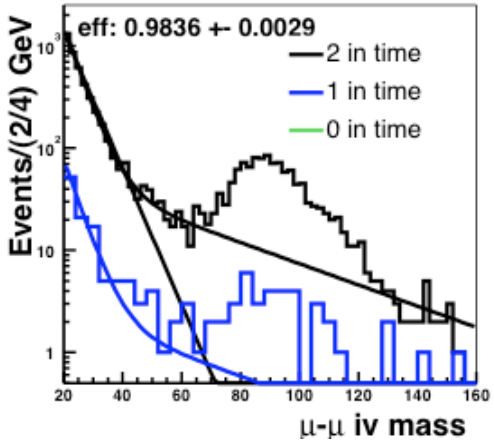


Muon Timing Efficiency

- Use MuoCandidate
- Cosmic-rejection using A+BC layer times
- Look at dimu-triggered events w. 2 med, trk muons, count evts in peak that have 0,1,2 mu in time







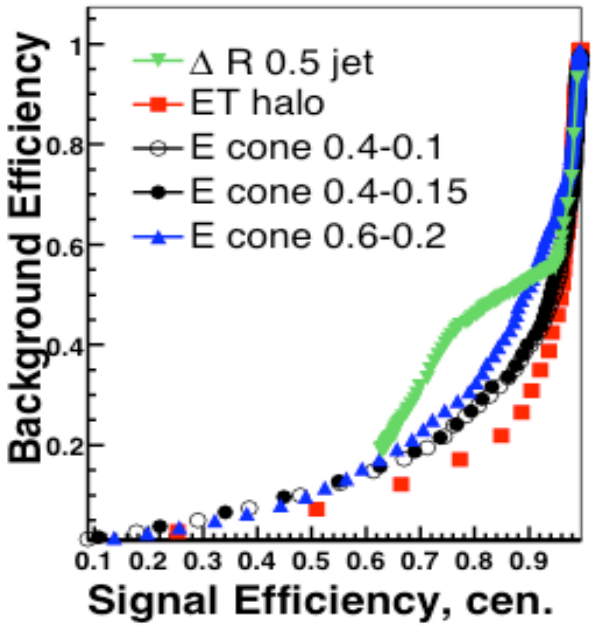
Muon Isolation

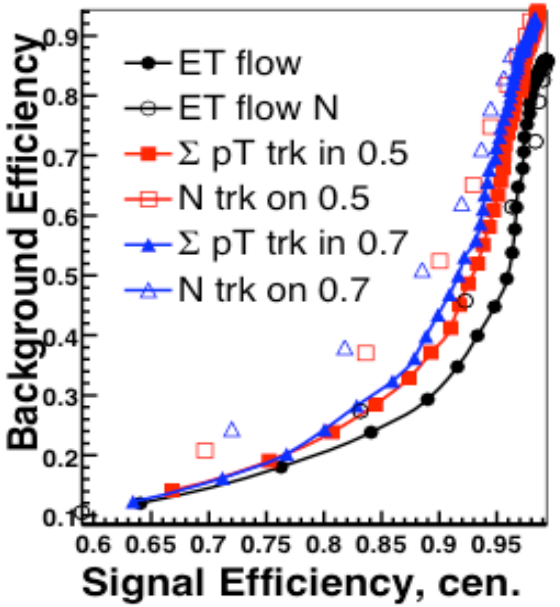
- Consider tracking + calo-based isolation variables
- Get efficiency+rejection numbers from Z+QCD samples
  - Z: two med+trk in mass window
  - QCD: p13 MET < 10 GeV

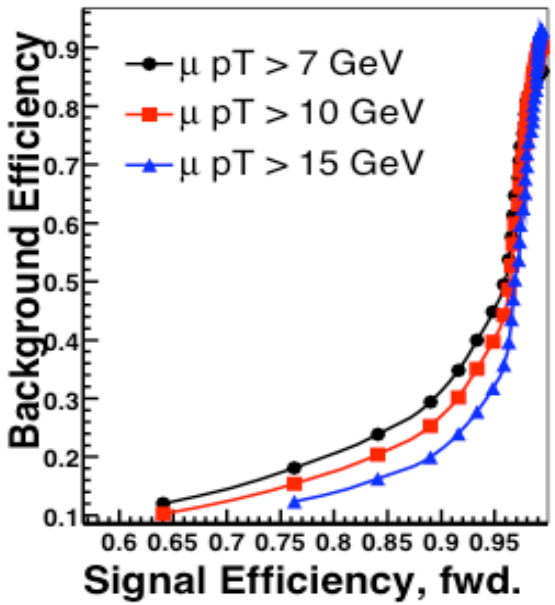
Signal efficiency	QCD eff in % for pT > 7 GeV	> 10 GeV	> 15 GeV
0.95	0.43±0.06	0.36±0.06	0.26±0.06
0.90	0.257±0.017	0.20±0.0155	0.13±0.011
0.85	0.175±0.011	0.13±0.01	0.080±0.006
0.80	0.134±0.007	0.099±0.0057	0.060±0.003

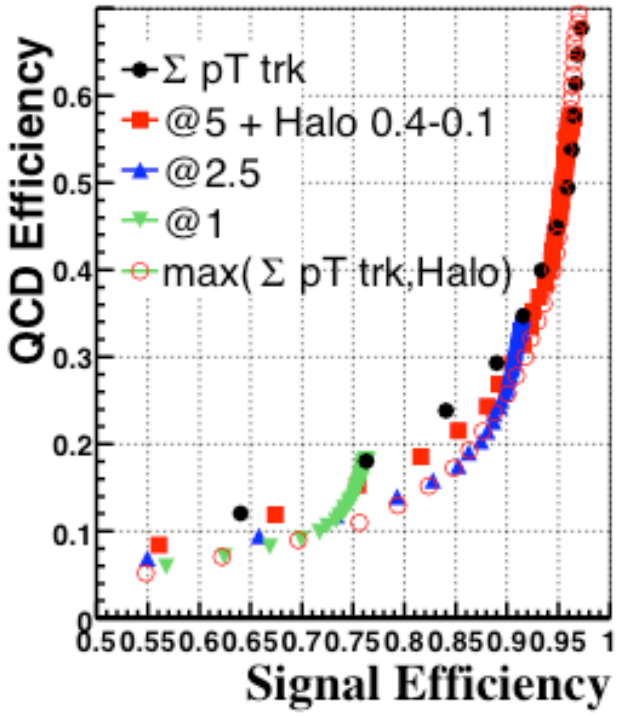
Signal efficiency	QCD eff in % for pT > 7 GeV	> 10 GeV	> 15 GeV
0.95	0.47±0.03	0.40±0.03	0.280±0.025
0.90	0.305±0.024	0.24±0.022	0.15±0.016
0.85	0.209±0.012	0.158±0.011	0.094±0.007
0.80	0.156±0.010	0.114±0.008	0.066±0.005

Muon Isolation (II)



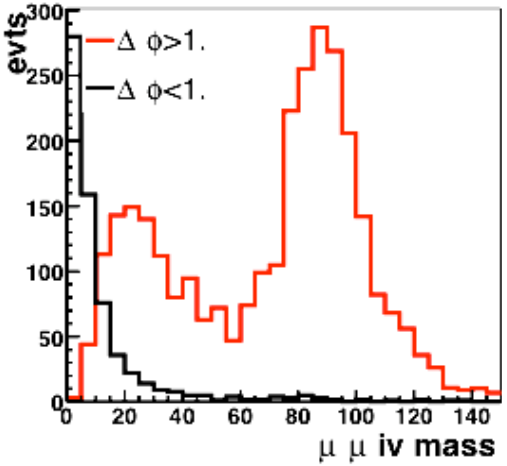


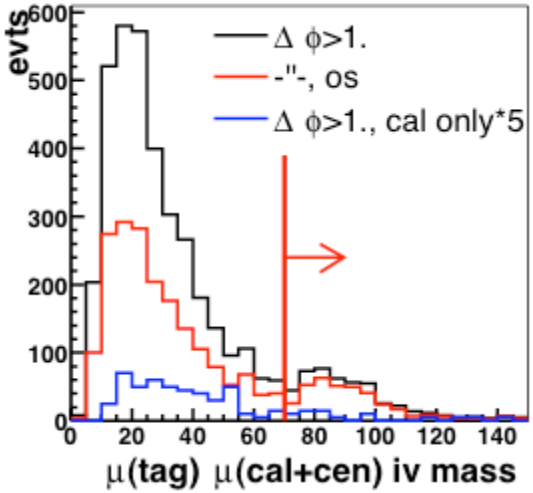


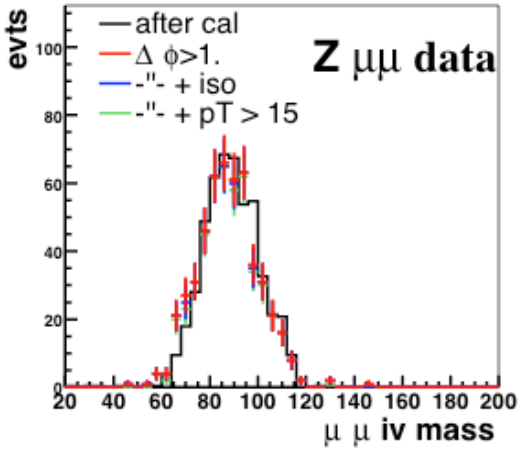


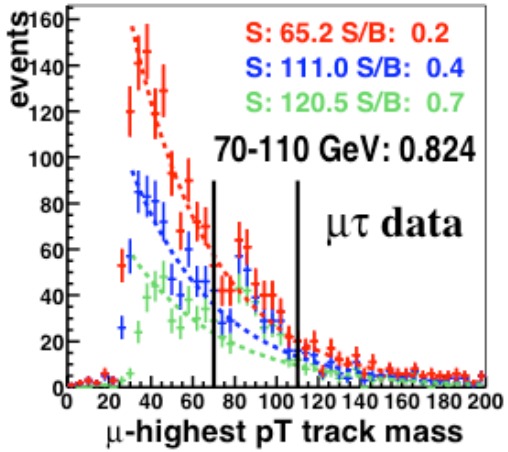
Backgrounds - Z□□

- Z□□
  - □ Rejection in 3 steps
    - ➔No other loose mu
    - ➔No cal+trk in Z window
    - ➔No isolated track w. pT > 15 in Z window
  - □ Use data Z to estimate eff. of cuts



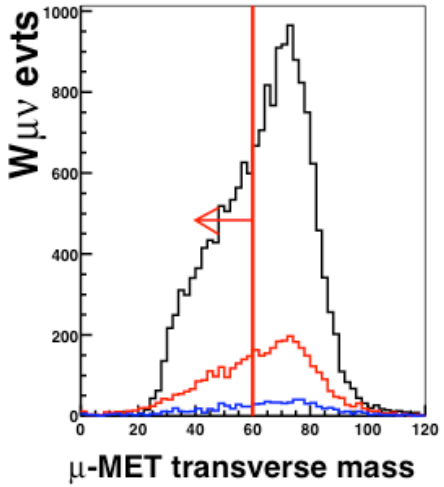


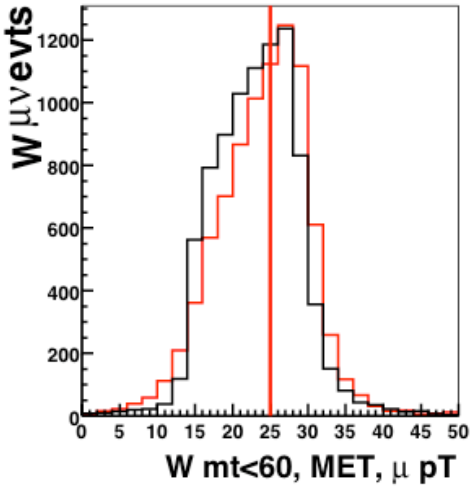


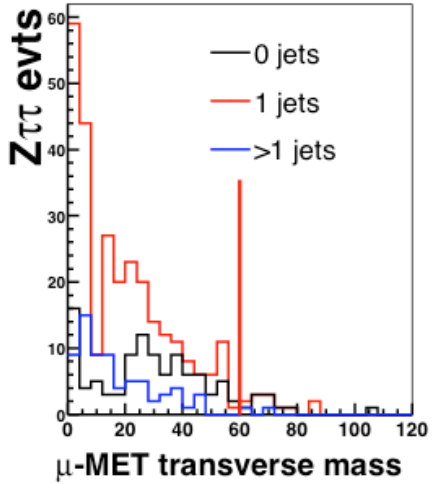


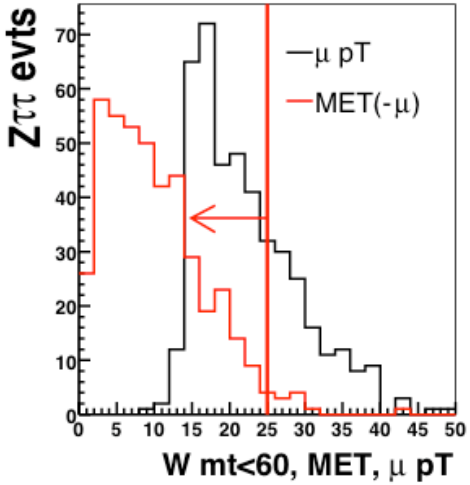
Backgrounds - W□□

- W□□
  - □ Rejection using transverse mass
  - □ And MET
  - □ No eff estimation from data yet

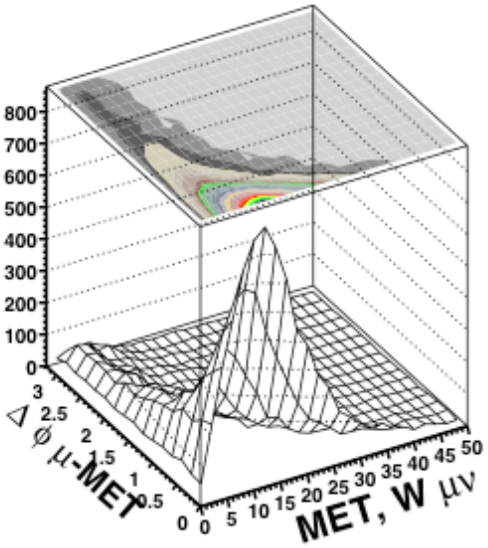


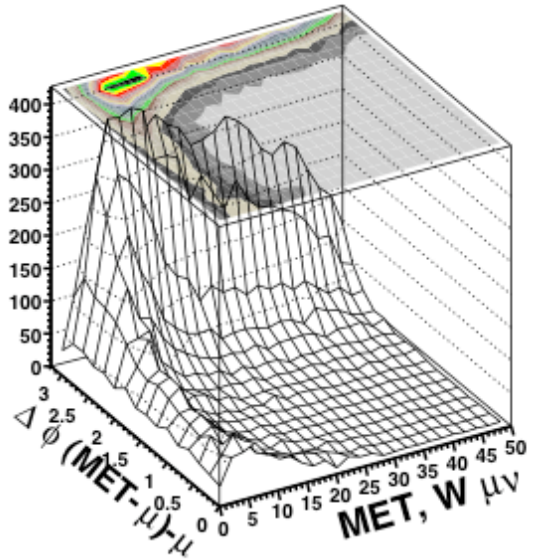


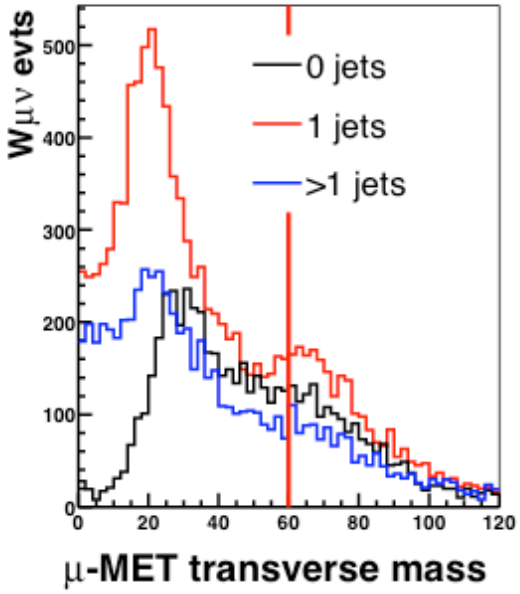


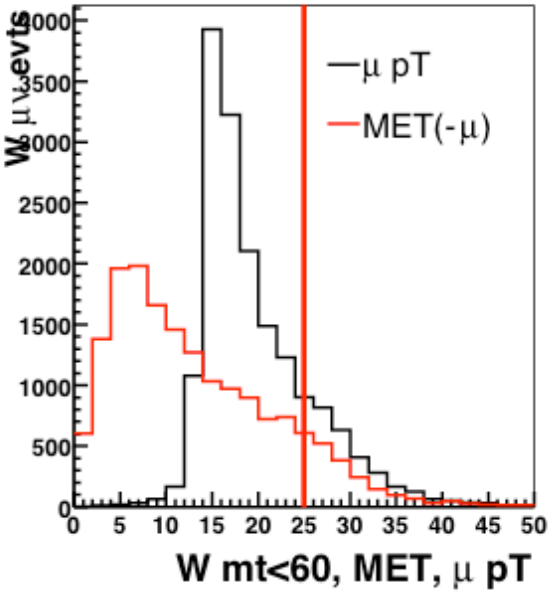


Data - W□□


Δ φ μ-MET
MET, W μν

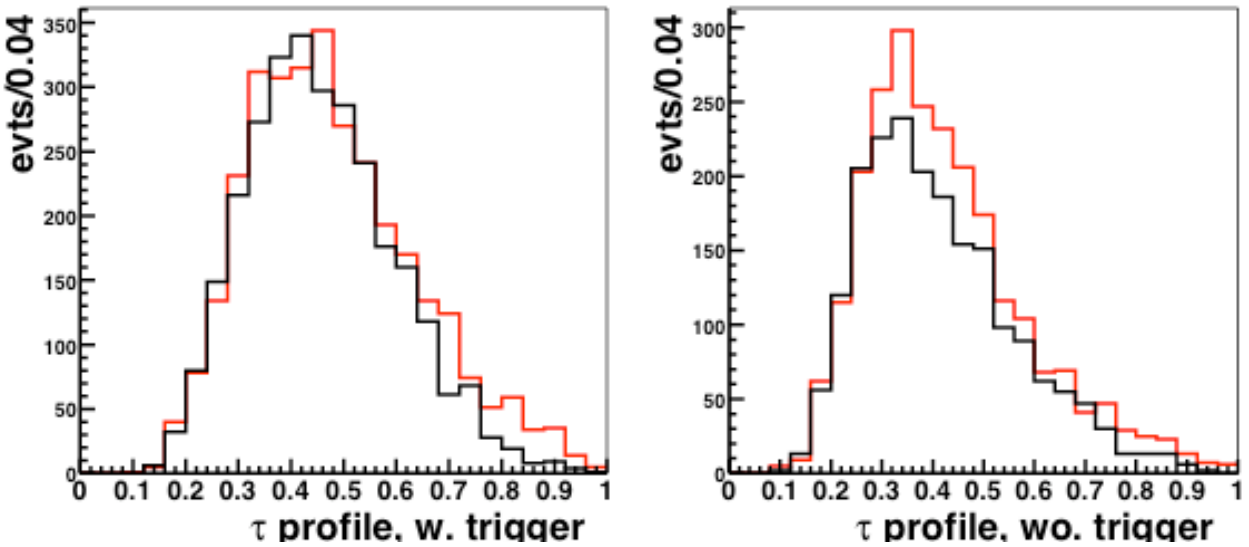

Δ φ (MET-μ)-μ
MET, W μν


Wμν evts
0 jets
1 jets
>1 jets
μ-MET transverse mass


Wμν evts
μ pT
MET(-μ)
W mt<60, MET, μ pT

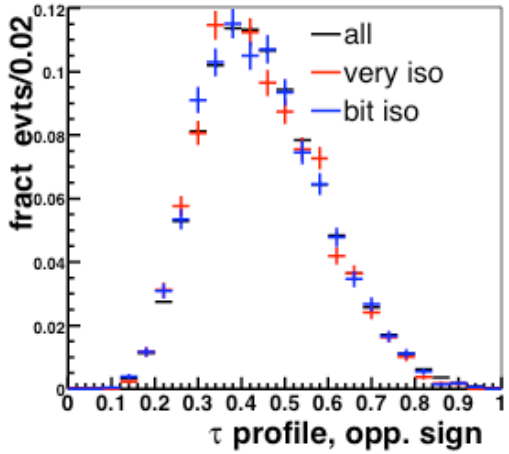
The hadronic tau

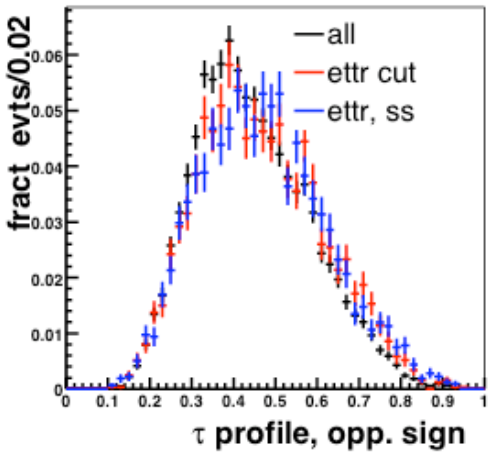
- Look at profile (ET1+ET2)/ET
- Look at trigger events “came in” on
  - Require L2M0-term
    - ➔determined eff
    - ➔basically un-prescaled

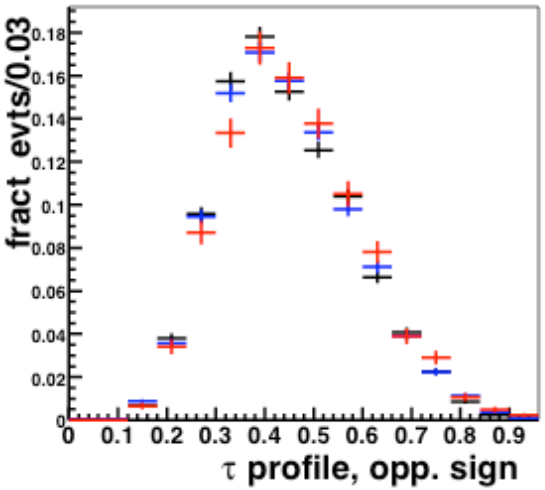


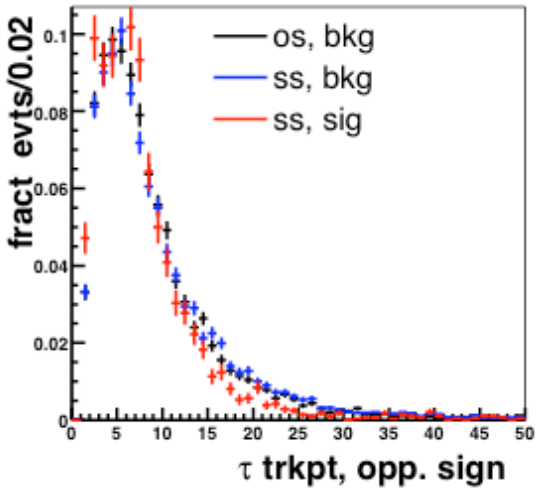
The hadronic tau - Bkg.

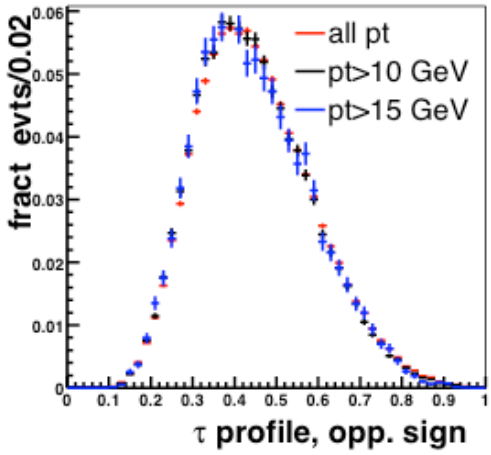
- Background sample:
  - Cuts->shape?





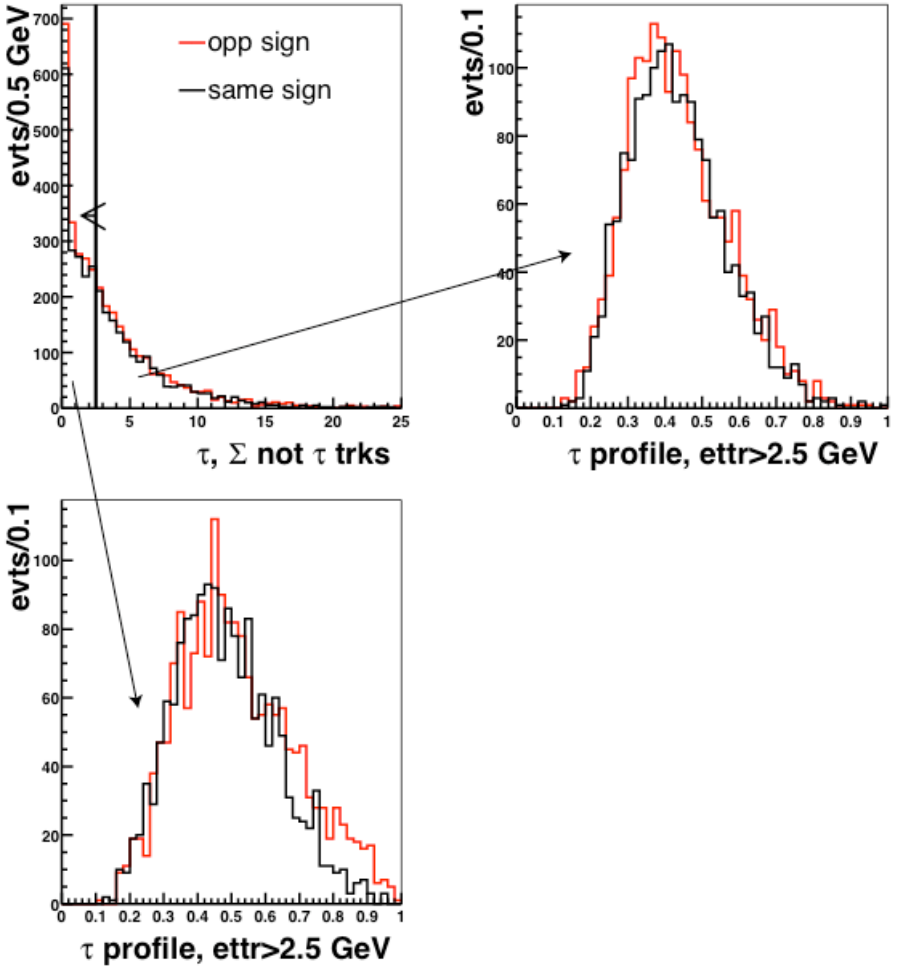






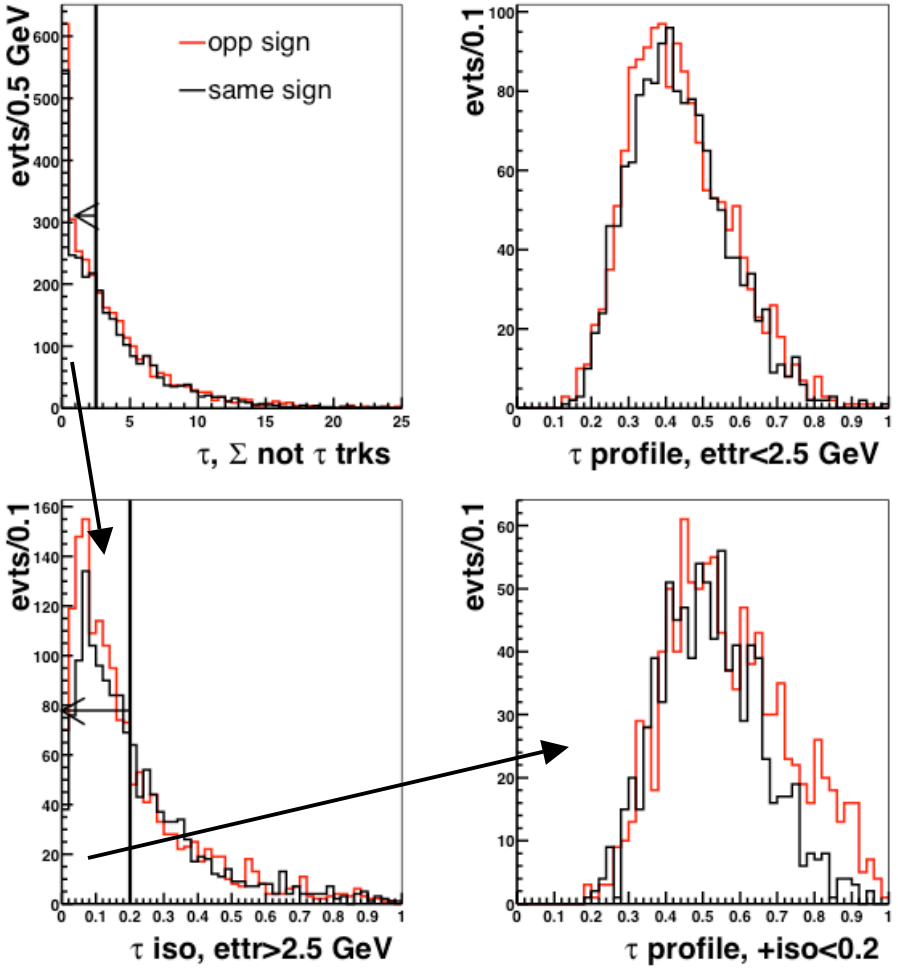
The hadronic tau - And Cuts

- Look at ettr:
  - Sum pT of add tracks in 0.5 cone



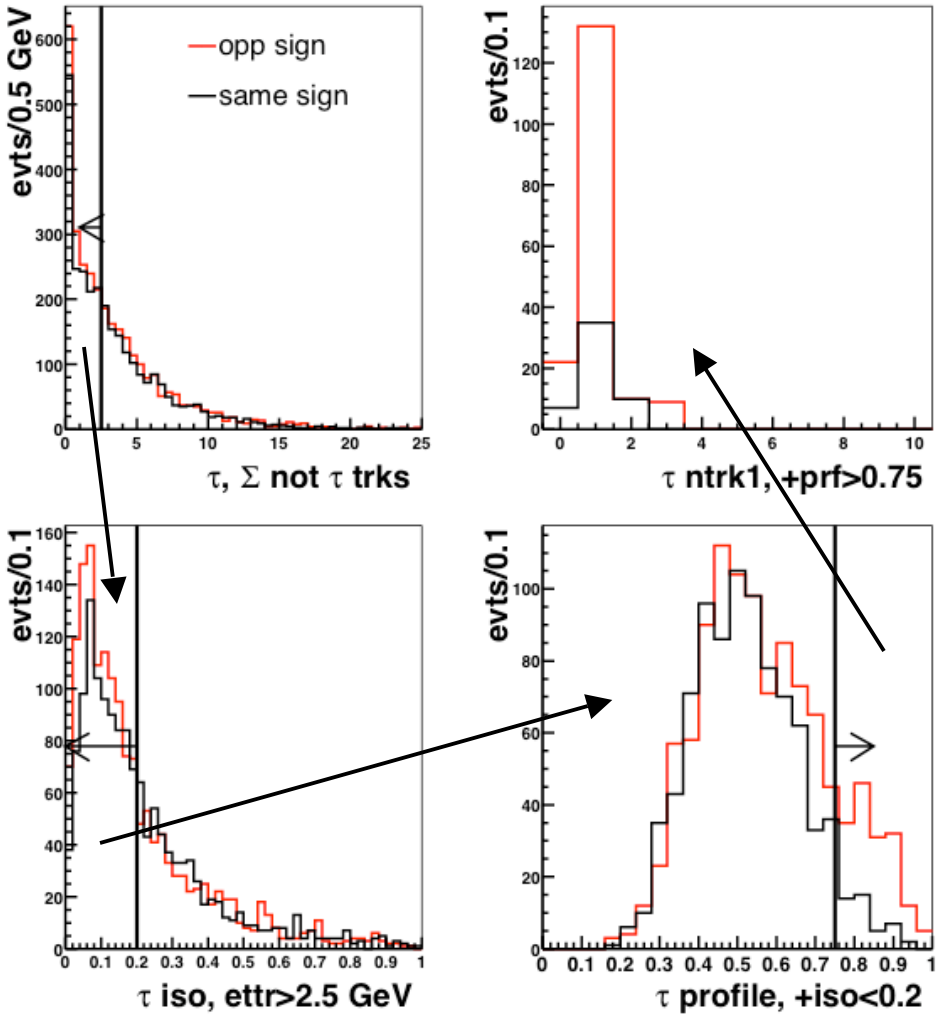
The hadronic tau - And Cuts

- Look at ettr:
  - Sum pT of add tracks in 0.5 cone
  - add iso



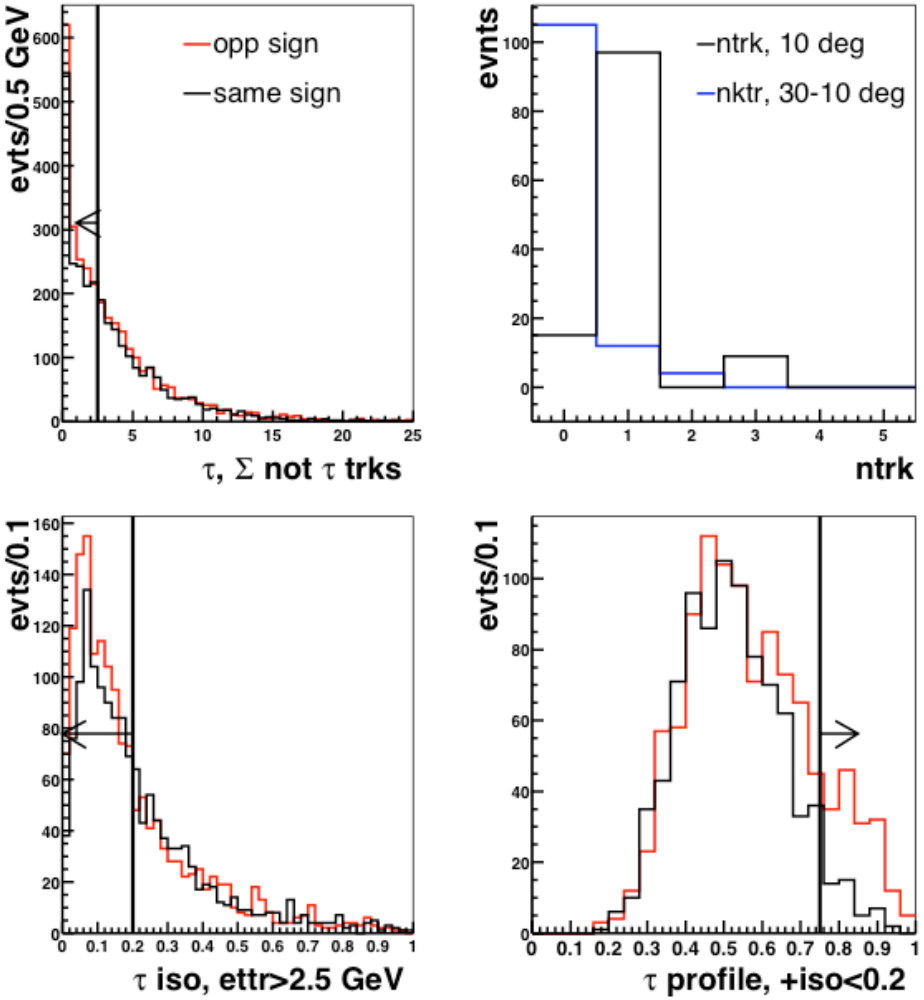
The hadronic tau - And Cuts

- Look at ettr:
  - Sum pT of add tracks in 0.5 cone
  - add iso
  - Add profile



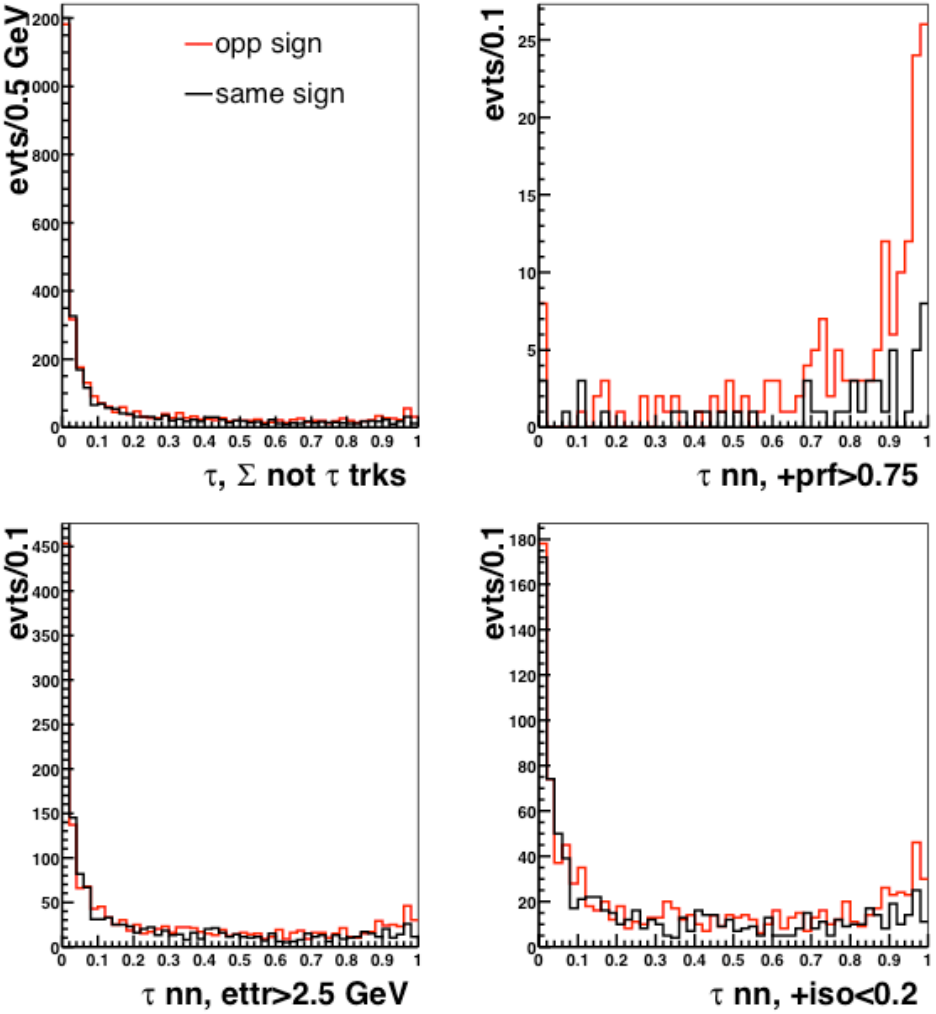
The hadronic tau - And Cuts

- Look at ettr:
  - Sum pT of add tracks in 0.5 cone
  - add iso
  - add profile
  - and look at tracks…



The hadronic tau - NN

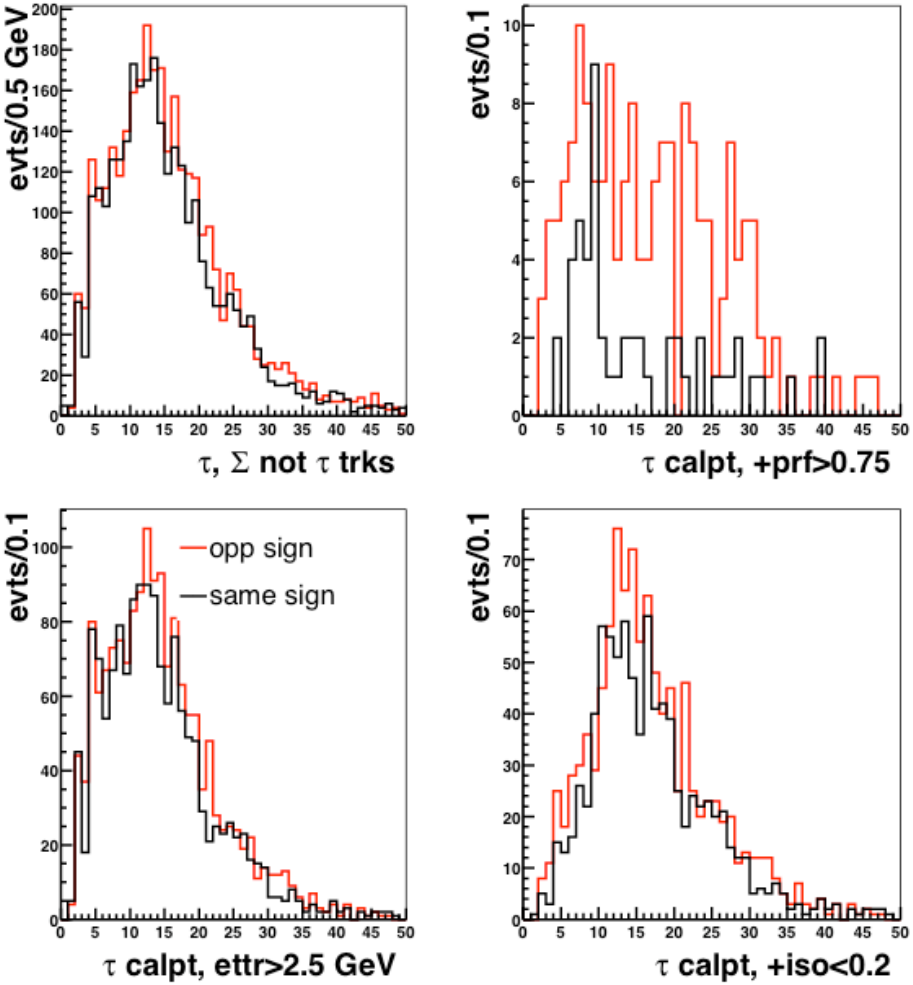
- For people who like neural nets even if these are trained on MC that does not describe the data….



The hadronic tau - cal pT

To see just just low energy "stuff"

Check track pT, look very similar



What remains to be done…

Divide into types and look at Et/pT

Invariant mass -> debug code

Factor opp sign - like sign -> numbers of events

Expected # events -> use eff numbers from data

Z □□ background -> practically done

Efficiency of cuts on tau - have to use MC

Use CTF p13.08 MC - about ready

(and as soon as QCD availible check if background is decribed….)